User manual M2

Profibus DP

Technical features:

- 6-digit red display (optional: green, orange, blue)
- minimal installation depth: 70 mm excluding plug-in terminal
- programming interlock via access code
- protection class IP65 (front side)
- plug-in terminal

Identification

STANDARD TYPES	ORDER NUMBER
Profibus DP Housing size: 96x48 mm	**M2-1BR6B.9000.570CD** **M2-1BR6B.9000.670CD**

Options – breakdown order code:

M 2- 1 B R 6 B. 9 0 0 0. 6 7 0 C D

Standard type M-Line

Installation depth
89 mm incl. plug-in terminal [2]

Housing size
B96xH48xD70 mm [1]

Display type
binary [B]

Display colour
Blue [B]
Green [G]
Red [R]
Yellow [Y]

Number of digits
6-digit [6]

Digit height
14 mm [B]

Digital input
Profibus [9]

Dimension
[D] physical unit

Version
[C] C

Switching points
[0] no switching points

Protection class
[1] without keypad, operation on the back
[7] IP65 / plug-in terminal

Supply voltage
[4] 115 VAC
[5] 230 VAC
[6] 10-30 VDC galv. insulated

Measuring input
[0] none

Analog output
[0] none

Sensor supply
[0] none

Please state physical unit by order, e.g. m/min.

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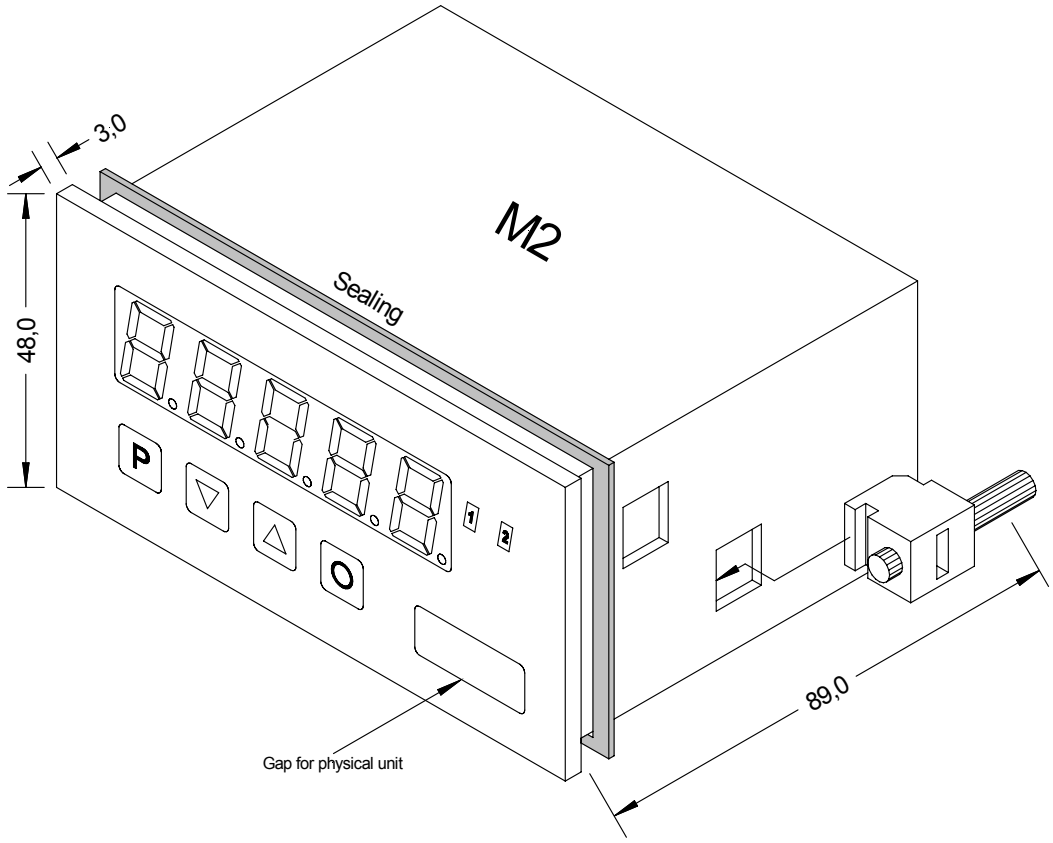
1. Assembly

Please read the *Safety advice* on *page 13* before installation and keep this user manual for future reference.



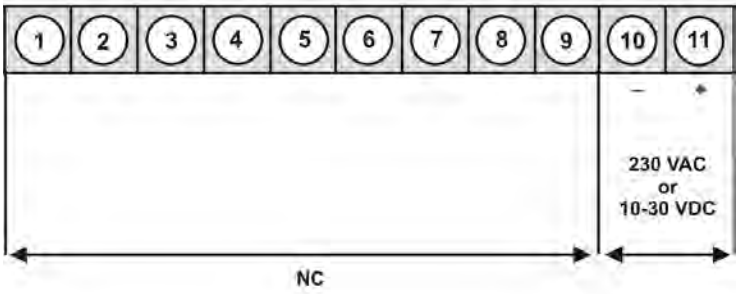
1. After removing the fixing elements, insert the device.
2. Check the seal to make sure it fits securely.
3. Click the fixing elements back into place and tighten the clamping screws by hand. Then use a screwdriver to tighten them another half a turn.

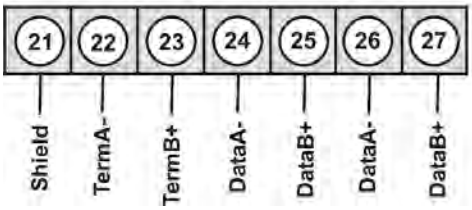
CAUTION! The torque should not exceed 0.1 Nm!

The dimension symbols can be exchanged before installation via a channel on the side!

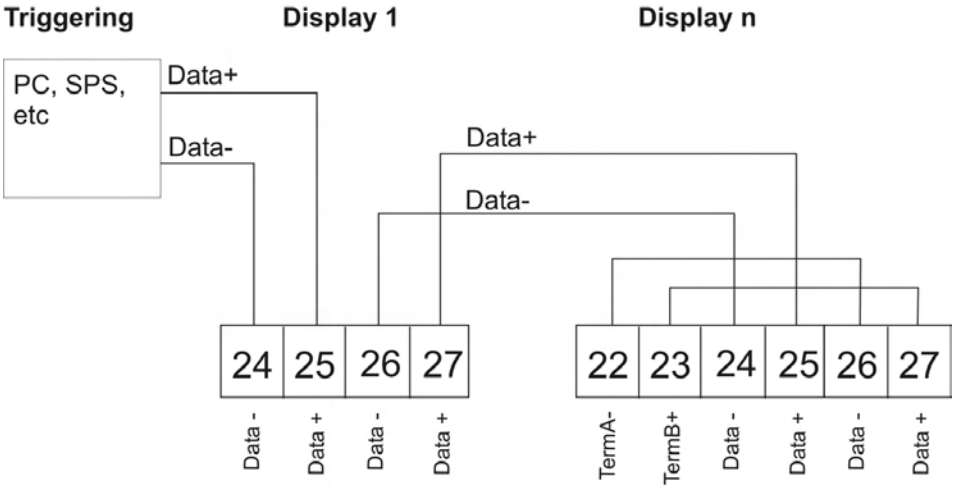
2. Electrical connection

Type M2-1BR5B.9000.570CD supply of 230 VAC
Type M2-1BR5B.9000.670CD supply of 10-30 VDC





Connection example:



Connection of several displays on one Profibus Bus-line.

Profibus arranges the devices in sequence. An allocation in form of a star is not acceptable! Both ends of the data line require a termination. One in the triggering included termination needs to be activated. The maximum allowable length of the data line depends on the baudrate an is 1000 m.

For simplification of the electrical connection, the terminals are carried out doubly. At the last device of tha bus-line, the termination can be switched onto the bus-line with two bridges.

3. Function and operation description

Operation

The device is triggered via Profibus and shows numerics and signs in a 6-digit 7-segment display.
Thereby the communication can be triggered via a Bus master. The display recognizes automatically the used Baudrate with a Bus master and needs as single information the Profibus address, which can be parameterised via the keypad of the display.

Parameterisation level:

Parameter deposited in the menu item can here be parameterised.
Functions, that can be changed or adjusted, are always signalised by a flashing of the display. Settings that are made in the parameterisation level are confirmed with **[P]** and thus safed. By pressing the **[O]**-key (zero-key) it leads to a break-off of the value input and to a change into the menu level.
All adjustments are safed automatically by the device and it changes into operating mode, if no further key operation is done within the next 10 seconds.

Operation and display elements:

Level	Key	Description
Menu level	P	Change to parameterisation level and deposited values.
	▲ ▼	Keys for up and down navigation in the menu level.
	O	Change into operation mode.
Parameterisation level	P	To confirm the changes made at the parameterization level.
	▲ ▼	Adjustment of the value / the setting.
	O	Change into menu level or break-off in value input.

4. Setting up the device

4.1. Switching-on

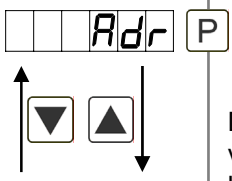
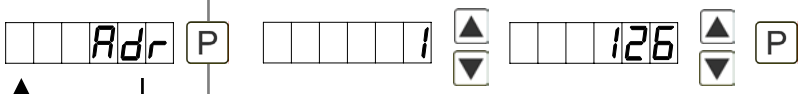
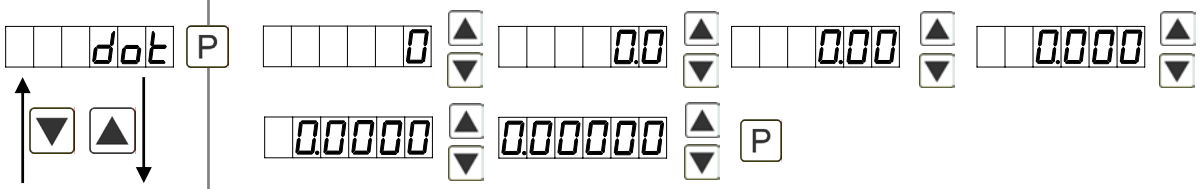
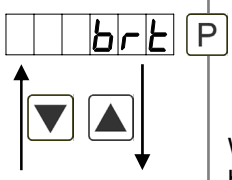
Once the installation is complete, you can start the device by applying the voltage supply. Before, check once again that all electrical connections are correct.

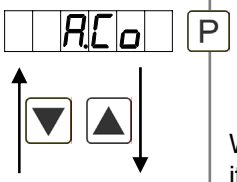
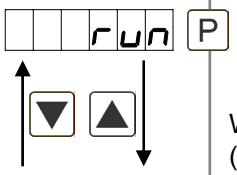
Starting sequence

For 1 second during the switching-on process, the segment test (8 8 8 8 8) is displayed followed by an indication of the software type and, after that, also for 1 second the software version. After the starting sequence, the device switches to operation/display mode.

4.2. Standard parameterisation: (Flat operation level)

To parameterize the display, press the **[P]** key in operating mode for 1 second. The display then changes to the menu level with the first menu item *TYPE*.

Menu level	Parameterisation level
	**Selection of the device address *ADR*:** Default: *125*  Device addresses from 1-125 can be parameterised. The address 126 is preset as default value, which is the delivery state. After changing this parameter, the device does a soft test bevor switching back into operation mode. After this, the new address will be directly in use.
	Setting the decimal point, *DOT*: Default: *0*  The decimal point on the display can be moved with [▲] [▼] and confirmed with **[P]**. The display then switches back to the menu level again.
	**Adjusting the brightness *BRT*:** Default: *100* With this parameter the brightness of the display can be reduced onto 25% of the total brilliancy. With **[P]** the selection is confirmed and the device switches back into menu level.

Menu level	Parameterisation level
	**Administrator code / Master code (4-digit number-combination free available), *A.CO*:** Default: *1234* With this code all parameters can be re-activated, after *LOC* has been activated under menu item *RUN* before. By pushing **[P]** in operation mode for approx. 3 seconds, *CODE* occurs in the display and enables the user to reach all parameters by entering the *A.CO*. While leaving the parameterisation under *RUN*, the parameterisation can be activated permanently by selection of *ULC*. So that at a renew pushing of **[P]** in operating mode, no new entering of the code needs to be done.
	**Activiation and/or deactivation of the programming interlock or closing-off of the parameterisation, *RUN*:** Default: *ULC* With the navigation keys [▲] [▼], one can choose between the deactivated key lock *ULOC* (works setting) and the activated key lock *LOC*. Confirm the selection with **[P]**. After this, the display confirms the settings with **"- - - - -"**, and automatically switches to operating mode. If *LOC* was selected, the keyboard is locked. To get back into the menu level, press **[P]** for 3 seconds in operating mode. Now enter the *CODE* (works setting *1 2 3 4*) that appears using [▲] [▼] plus **[P]** to unlock the keyboard. *FAIL* appears if the input is wrong. By pressing **[P]** in operation mode for approx. 3 seconds, the first menu group *ADR* appears in the display and thus confirms the change into parameterisation. It stays activated as long as *ULOC* is entered in menu group *RUN*, thus the display is set back in standard parameterisation again.

5. Reset to factory settings (default values)

To return the unit to a **defined basic state**, a reset can be carried out to the default values.
The following procedure should be used:

- Switch off the power supply
- Press button [**P**]
- Switch on voltage supply and press **[P]**-button until „- - - - -“ is shown in the display.

With reset, the default values of the program table are loaded and used for subsequent operation. This puts the unit back to the state in which it was supplied.

Caution! All application-related data are lost.

6. Operating modes

The Profibus displays support 5 different operating modes, as given below.

6.1. Operating mode 1

Display of 16 bit signed integer values (-32768…32767).

Configuration values

Byte-No.	Characteristic	Description	Function
0	**0x21**	2 Bytes output data	Display value „signed integer“

Output data

Byte-No.	Function
0	Display value High-Byte
1	Display value Low-Byte

6.2. Operating mode 2

Display value of 16 bit signed integer values (-32768…32767), with brightness control, flashing and position after decimal point.

Configuration data

Byte-No.	Characteristic	Description	Function
0	**0x21**	2 Bytes output data	Panel parameter (see 6.6.)
1	**0x20**	1 Byte output data	Position after decimal point (see 6.7)
2	**0x21**	2 Bytes output data	Position after decimal point „signed integer“

Output data

Byte-No.	Function
0-1	Panel parameter (see explanations under 6.6.)
2	Position after decimal point (see explanations under 6.7)
3	Display value High-Byte
4	Display value Low-Byte

6.3. Operating mode 3

Display value of 32 bit signed integer values (-4.294.967.296…4.294.967.295).

Configuration data

Byte-No.	Characteristics	Description	Function
0	**0x23**	4 Bytes output data	Display value „signed long integer“

Output data

Byte-No.	Function
0	Display value High-Word, High-Byte
1	Display value High-Word, Low-Byte
2	Display value Low-Word, High-Byte
3	Display value Low-Word, Low-Byte

6.4. Operating mode 4

Display value of 16 bit signed integer value (-32768…32767), with brightness control, flashing and position after decimal point.

Configuration data

Byte-No.	Characteristic	Description	Function
0	**0x21**	2 Bytes output data	Panel parameter (see explanations 6.6)
1	**0x20**	1 Byte output data	Position after decimal point (see 6.7)
4	**0x23**	4 Bytes output data	Display value „signed long integer“

Output data

Byte-No.	Function
0-1	Panel parameter (see explanations under 6.6)
2	Position after decimal point (see explanations under 6.7)
3	Display value High-Word, High-Byte
4	Display value High-Word, Low-Byte
5	Display value Low-Word, High-Byte
6	Display value Low-Word, Low-Byte

6.5. Operating mode 5

Direct display triggering with brightness control.

Configuration data

Byte-No.	Characteristics	Description	Function
0	**0x21**	2 Bytes output data	Panel parameter (see explanations 6.6)
2	**0x21**	2 Bytes output data	Mode (see explanations 6.8)
4	**0x27**	8 Bytes output data	Direct display

Output data

Byte-No.	Function
0-1	Panel parameter (see explanations 6.6)
2-3	Mode (see explanations 6.8)
4	1. Digit (display digit with the lowest value)
5	2. Digit
6	3. Digit
7	4. Digit
8	5. Digit
9	6. Digit
10	7. Digit
11	8. Digit

With 6-digit displays, the 1st and 2nd digit may not be triggered (and so on). But all 8 digits always need to be assigned!

6.6. Explanations to panel parameters

Byte-No.	Function
0-1*	00 equates 100 % brightness 01 equates 75% brightness 10 equates 50% brightness 11 equates 25 % brightness
2-7	Reserved
8	Flashing at 1.digit (display digit with the lowest value)
9	Flashing at 2.digit
10	Flashing at 3.digit
11	Flashing at 4.digit
12	Flashing at 5.digit
13	Flashing at 6.digit
14	Flashing at 7.digit
15	Flashing at 8.digt

*Brightness control not availabe for outdoor displays!

6.7. Explanations to position after decimal point

Byte-No.	Function
0-2	000 no position after decimal point 001 1 position after decimal point 010 2 positions after decimal point 011 3 positions after decimal point 100 4 positions after decimal point 101 5 positions after decimal point 110…6 positions after decimal point 111…7 positions after decimal point
3-6	Reserved
7	0 Display 1 Display test

6.8. Explanations of the mode

Byte-No.	Function
0-6	00000000 Display via ASCII table (see 6.8.1) 00000001 Direct triggering of the segments (see 6.8.2) 00000010 Reserved **…** 00000100 Reserved
7	0 Display 1 Display test

6.8.1. Mode 0

ASCII table:

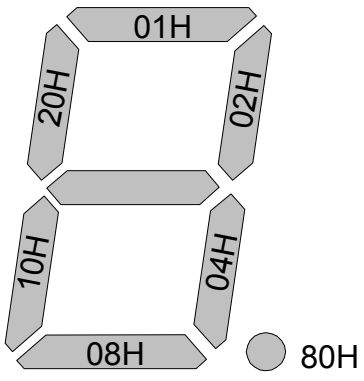
HEX	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00																
10																
20																
30																
40																
50																
60																
70																

At all empty fields a space is displayed.

6.8.2. Mode 1

Direct triggering of the segments (bit coded, all values in hexadecimal notation.

Example:
To display the sign with the ASCII code 32H („2“) in mode 1, the value 5BH = (01H x 02H + 40H + 10 H + 08H) needs to be entered in the data field.



7. Error indications

The display controls several possibilites of errors and shows them if required in the display.

Overflow behavior

If a process value (Integer value) is transfered, that exceeds the display range of the display, then the display shows a fast flashing display with the incorrect value, this means the available significant digits. The minus sign needs its own digit. The same happens in operation type 5, if segments are triggered, that are not available in the display. In this case the defined display segments are flashing with a high frequency.

Error indications

During the starting sequence a check of the configuration is done. Furthermore an error number / warning number can be found in the Gateway. It then alerts a checksum error, an EEPROM error or a Profibus error.
After this the device processor starts with the cyclic scanning of the display segments that need to be displayed, which state the operating mode.

Source of error	Message	Description
Checksum error	„HLP“	Parameter in device processor is not consistent
Gateway error	„Er1“	Gateway does not answer
EEPROM error	„Er2“	Communikation error with EEPROM
SPC3 error	„Er3“	Gateway Profibus error
PCHECKSUM error	„Er4“	Gateway checksum of a parameter is faulty
DATA overflow	„Er5“	Gateway receives too many data
Data exchange error	„Er6“	Profibus master offline
Configuration error	„Er7“	Gateway works in an inoperative operating type
Watchdog overflow	„Er8“	Watchdog in Gateway is invalid

If an initialisation error occurs, the error indications appears directly in the display. At an operating error the display reacts with fast flashing of the current dates for at least 10 seconds.

Occured errors can be called up by shortly pushing the [▲] or [▼] key. The single errors can be called up by pushing the keys shortly several times. Each single error can be deleted by pushing the [▲] or [▼] key for approx. 1 second.

If no error did occur then „*NOE*“ appears. After the error indication the display changes back automatically into operting mode after approx. 7 seconds.

8. Technical data

Housing	
Dimensions	96x48x70 mm (BxHxD)
	96x48x89 mm (BxHxD) incl. plug-in terminal
Panel cut-out	$92.0^{+0.8}$ x $45.0^{+0.6}$ mm
Wall thickness	up to 15 mm
Fixing	screw elements
Material	PC Polycarbonate, black, UL94V-0
Sealing material	EPDM, 65 Shore, black
Protection class	Standard IP65 (Front), IP00 (Back)
Weight	approx. 400 g
Connection	plug-in terminal; wire-cross section up to 2.5 mm^2
Display	
Digit height	14 mm
Segment colour	red (optional green, yellow or blue)
Display	6-digit
Interface Profibus	
Protocol	Profibus DP
Baud rates	Autobaud recognition up to 12 MBaud
Interface	RS485
Wire length	max. 1000 m
Bus termination	pull-up/pull-down according to EN50170
Termination	can be activated via connection terminal
Power pack	10-30 VDC max. 4 VA 230 VAC +/- 10 % max. 10 VA
Memory	EEPROM
Data life	> 30 years at 25°C
Ambient conditions	
Working temperature	0…50°C
Storing temperature	-20…80°C
Wheatering resistance	relative humidity 0-80% on years average without dew
EMV	EN 61326
CE-sign	Conformity to directive 2004/108/EG
Safety standard	According to low voltage directive 2006/95/EG EN 61010; EN 60664-1

9. Safety advice

Please read the following safety advice and the assembly *chapter 1* before installation and keep it for future reference.

Proper use

The **M2-1B9-device** is designed for the evaluation and display of sensor signals.

Attention! Careless use or improper operation can result in personal injury and/or damage to the equipment.

Control of the device

The panel meters are checked before dispatch and sent out in perfect condition. Should there be any visible damage, we recommend close examination of the packaging. Please inform the supplier immediately of any damage.

Installation

The **M2-1B9-device** must be installed by a suitably **qualified specialist** (e.g. with a qualification in industrial electronics).

Notes on installation

- There must be no magnetic or electric fields in the vicinity of the device, e.g. due to transformers, mobile phones or electrostatic discharge.
- The **fuse rating** of the supply voltage should not exceed a value of **6A N.B. fuse**.
- Do not install **inductive consumers** (relays, solenoid valves etc.) near the device and **suppress** any interference with the aid of RC spark extinguishing combinations or free-wheeling diodes.
- Keep input, output and supply lines separate from one another and do not lay them parallel with each other. Position “go” and “return lines” next to one another. Where possible use twisted pair. So, you receive best measuring results.
- Screen off and twist sensor lines. Do not lay current-carrying lines in the vicinity. Connect the **screening on one side** on a suitable potential equaliser (normally signal ground).
- The device is not suitable for installation in areas where there is a risk of explosion.
- Any electrical connection deviating from the connection diagram can endanger human life and/or can destroy the equipment.
- The terminal area of the devices is part of the service. Here electrostatic discharge needs to be avoided. Attention! High voltages can cause dangerous body currents.
- Galvanic insulated potentials within one complex need to be placed on a appropriate point (normally earth or machines ground). So, a lower disturbance sensibility against impacted energy can be reached and dangerous potentials, that can occur on long lines or due to faulty wiring, can be avoided.